

ABSTRACT
MILLICAN FIELD:
RESERVOIR FACIES ON AN OFFSHORE BANK
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The Millican Field, in northwest Coke County, Texas, was discovered in 1948 with the completion of the Sun Oil No. 1 P.W. Millican. The field was discovered by a combination of surface and subsurface mapping. The Millican Field is located along the Eastern Shelf of the Midland Basing and produces from a carbonate sequence of Upper Canyon age. The total sequence of the Millican Field reaches a maximum thickness of 1100 feet; however, the carbonate within the field is vertically discontinuous. The pay zone within the field is in the upper 200 feet of this carbonate section. The field has produced 6.5 million barrels of oil and 12 BCF of gas from 60 wells at an average depth of 6000 feet.

Millican Field is situated along a north-south trend of several large carbonate banks of Pennsylvanian age. Mapping just on the limited scale of the field itself (1 X 4 miles) shows that the Canyon carbonates in the Millican Field can be interpreted as a shelf-edge trend. However, regional correlations by Clark (1962) and Mear (1982) suggest that limestone banks such as Millican, Jamieson and I.A.B. fields may represent offshore, reef atolls situated seaward of the coeval shelf edge to the east.

Core analysis of the Millican Field indicates that this carbonate reservoir buildup consists of three major reefal facies within the field: (1) phylloid algal wackestone to packstone; (2) crinoid and bryozoan wackestone to packstone; and (3) biopackstones to grainstones containing forams, fusulinids, crinoids, and mollusks. Wells outside the field area consist of a thinner sequence of shale, shaly carbonates, and sandstones interpreted to represent slope to basin facies. The primary reservoir facies in the field is the phylloid algal wackestone to packstone units. Reservoir porosities and permeabilities result from solution-enlargement and intercrystalline porosity due to matrix-selective dolomitization. In contrast, porosity within the originally porous grainstone facies of the field has been occluded by sparry calcite cements.

The exploration model for Millican type reservoirs should incorporate regional seismic and/or structural surveys to determine areas of optimal paleoconstructional topography (either along a shelf-edge or seaward of the shelf-edge); and detailed local facies analyses to determine the distribution of reservoir paleofacies and diagenetic controls on porosity formation or occlusion.